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ABSTRACT

Currently available spreadsheet programs for microcomputers provide many features that can be very useful for evaluators and researchers. Some of the basic concepts involved in spreadsheet use are introduced, and information is provided on the use of spreadsheets in maintaining and analyzing evaluation data. The spreadsheet used in the discussion of features and in the examples is Microsoft's "Excel 4.0 for Windows," a program with many new statistical functions. There are many advantages in using spreadsheets, including ease of data entry, graphing capabilities, formatting capabilities, sorting, and the wide range of statistical functions available. Spreadsheets are especially helpful for those who do not have access to mainframe computers or expensive statistical software. One figure gives an example of spreadsheet use, and an additional 11 figures in an appendix provide further examples. Tables in the appendix contain the following data: (1) statistical functions available in three spreadsheet programs; (2) additional functions available with Macro add-on files; (3) logical functions available in Excel; and (4) database functions in Excel. (SLD)

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Using Spreadsheets in the Management, Analysis, and Reporting of Evaluation Data

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Introduction

The currently available spreadsheet programs for microcomputers provide many new features that can prove to be very useful for evaluators and researchers. The large amounts of data collected by these individuals can be easily maintained, analyzed, graphed, and reported using spreadsheets. Many evaluators or researchers may not have access to mainframes or comprehensive statistical programs for the microcomputer, and spreadsheet programs for the microcomputer are a viable alternative. Although there are less complex and less expensive statistical packages available for the microcomputer, many of these require data to be typed into the program in a spreadsheet format, but allow less flexibility in the manipulation of the data. This paper introduces some of the basic concepts involved in spreadsheet use, and provides information on the use of spreadsheets in maintaining and analyzing evaluation data.

The spreadsheet program used in the discussion of features and in the examples in this paper is Microsoft Corporation's *Excel 4.0 for Windows*. This program was selected because it was found to be the most comprehensive spreadsheet program for microcomputers with many new statistical functions available. "On the Windows side of things, Excel remains the front-runner" (Stinson, 1992, p. 112). "Excel also has the broadest range of functions in any of the shipping spreadsheets, and it's the only one with a built in spell-checker" (Miller, 1992, p. 82). "Since its first release, Excel has always had the most powerful function library and the most sophisticated tools for building, auditing, and consolidating two-dimensional worksheet models" (Stinson, 1992, p. 114).

According to Bakeman (1992), spreadsheets are the second most common application programs utilized by microcomputer users. Initially spreadsheets were used most commonly for business applications, but many sophisticated functions have been added during recent revisions of many of the spreadsheets that have led to their use in other applications. Microsoft Corporation has added to *Excel* "a library of advanced functions, a wealth of new statistical

commands, a crosstab generator that is easy enough for anyone to use, a beefed up optimizer with integer-programming capability, drag-and-drop cell manipulation, and direct support for [Lotus] 1-2-3 macros" (Stinson, 1992, p. 112). Most spreadsheet programs for the microcomputer are very similar in the manner in which data are entered, although they may differ in the way commands are accessed. Spreadsheet programs generally include tutorials for help in learning how to use the programs and have extensive help functions for specific questions. Data can be imported into most spreadsheets from several different formats.

Basic Concepts in Spreadsheet Use

A spreadsheet consists of columns and rows that form a matrix. The rows are generally labeled with numbers (i.e., 1, 2, 3, etc.) and the columns are generally labeled with letters (i.e., A, B, C, etc.) The intersection of a column and a row is called a cell, and each cell is identified by the column letter and row number that intersect. The column letter and row number are called a cell address. For example, the cell address B2 identifies a cell that is two units over and two units down from the top left hand corner of the spreadsheet. An example of a spreadsheet is presented in Figure 1.

	A	B	C	D
1	Student Name	Score 1	Score 2	Score 3
2	Mary	80	90	85
3	John	85	90	90
4	Elaine	95	97	98

Figure 1. An example of a spreadsheet.

When a spreadsheet is first accessed, the cursor generally will be in the upper left hand corner in cell A1. The directional or cursor keys are used to move from cell to cell. Spreadsheet cells can contain several types of data including values, labels, formulas, and functions. Calculations are based on values, which can be numbers, dates, time, or scientific

numbers. Labels are composed of alphanumeric characters and are used to name or describe the data in a spreadsheet (i.e., student names, months, revenue or expense categories, etc.). Formulas are mathematical equations created by the user and produce a result in the cell in which they appear based on data in other cells. Formulas can be as simple as a pointer to another cell (i.e., =A2 in cell A5 causes A5 to return the value contained in cell A2) or they can combine values in two or more cells using mathematical operators and functions and can be very complex. The mathematical operators allowed include addition (+), subtraction (-), exponentiation (^), multiplication (*), and division(/). The mathematical operations are performed from left to right in the following order unless parentheses are used: exponentiation, multiplication, division, addition, and subtraction. If parentheses are included in the formula, the operations in the parentheses are performed first, in the same order as normal operations, and then the rest of the formula is calculated. An equal sign is required at the beginning of each formula; that is how *Excel* recognizes the numbers as formulas.

Functions are built-in formulas that calculate results for mathematical operations faster and more accurately than formulas created by the user. For example, the function SUM [=SUM(C6:C12)] calculates faster than =C6+C7+C8+C9+C10+C11+C12, is easier to type, and is less likely to contain errors. Functions included in spreadsheets generally include financial, mathematical, statistical, trigonometric, and logical functions. *Excel* also contains database, date and time, hyperbolic, information, lookup, matrix, and text functions (Microsoft Corporation, 1992a). Of the spreadsheets examined, *Excel* had the most comprehensive number of functions. The statistical functions included in *Excel*, are presented in Appendix A, Table 1. Additional statistical functions available using macro add-in files are presented in Table 2, and logical functions available in *Excel* are presented in Appendix A, Table 3 (Microsoft Corporation, 1992a).

When formulas are typed, the cell references in the formula can be entered as relative or absolute. Relative refers to a cell's position on the spreadsheet, with reference to other cells.

When a formula is relative, as it is copied or moved from one cell to another, the formula is adjusted to the cell's new position in the spreadsheet (i.e., if the formula C3+1 in cell C4 is copied or moved to cell D4, the formula becomes D3+1). An absolute cell reference is a cell address in a formula that always refers to the same cell even if the formula is copied or moved to a new location in the spreadsheet (i.e, $B$6+1 in cell B7, remains $B$6+1 even when the formula is copied or moved to cell C8). Absolute references are denoted using a dollar sign ($) before the column letter and/or row number. If the user wanted the column to be absolute and the row relative the cell address would be denoted $D4; if the user wanted the column to be relative and the row absolute the cell address would be denoted D$4; and if the user wanted the entire cell address to be absolute the cell address would be denoted $D$4.

One of the major advantages of using spreadsheets is that the cells in a spreadsheet are linked by computations, so when a change is made in one cell it affects changes in the other cells it is linked to. This means that recalculations can be accomplished instantly. Another advantage is that templates can be created. A template is a model of a spreadsheet created as a basic pattern for other similar documents. For example, a budget can be created, saved as a template, and used to fill in data that varies from month to month or year to year. Templates also can be used over and over with different data to test results. Other spreadsheet advantages include the ease of copying or moving formulas from cell to cell or from spreadsheet to spreadsheet; numerous formatting commands that make it simple to add, delete, or move rows and columns of data; and the ability to link worksheets together. One worksheet can be linked to source data in another worksheet so any changes made in the first worksheet are instantly reflected in the other worksheet. Several worksheets can be linked together at one time.

Excel also allows the management of files in a type of document called a workbook. Several files including worksheets, charts, and macros may be created for one project. The workbook document stores all of the files together. When the workbook document is

accessed, all of the documents stored in the workbook are accessed together. This provides for easier file management and security, quick movement between documents, the ability to view one or more documents at a time, and means the user can be assured that all necessary documents for a project have been included. The price of *Excel* and other spreadsheets differs depending on the vendor, but most are moderately priced and affordable by individuals who have a need for data management, manipulation, and analyses. Rather than having to purchase several programs for management and analysis of data, and creation of charts and graphs, most spreadsheets contain all of these functions.

The size of a sample from which data are collected can range from small to quite large (tens of thousands). The size of a data sample that can be analyzed using a spreadsheet is dependent upon the microcomputer being utilized, including hard disk size and how much extended memory is available. A single worksheet in *Excel* consists of 4,194,304 cells. Each cell can contain up to 255 characters (Microsoft Corporation, 1992b). Although memory limitations will not allow the use of all available cells, it is feasible to use spreadsheets to manage and analyze large amounts of data. The time it takes to calculate a spreadsheet also is dependent upon the type of microcomputer being used. Only those cells affected by the change are recalculated, so time varies. Recently a spreadsheet with a sample of 484 students, consisting of approximately 13,700 data cells was created using an 80386/16 megahertz Leading Edge computer with 8 megabytes of random access memory (RAM). When a change was made at the beginning of the spreadsheet that affected almost all cells, the recalculation time took approximately 10 to 15 minutes. When changes were made that affected only several thousands of the cells the recalculation took only seconds. The spreadsheet also consisted of many formulas that contained arrays, which take longer to calculate than regular formulas.

Excel also has database capabilities. Each row in the spreadsheet can serve as a record and each column can be considered a field in the record. When a spreadsheet file is

treated as a database, normal database functions can be utilized. These include sorting by fields or records, querying, comparison of data, calculation, searching for records, extracting records according to specified criteria, adding and deleting records and fields, and accessing files created by other database programs such as dBASE IV. The comparison operators include equal to (=), greater than (>), less than (<), greater than or equal to (>=), less than or equal to (<=), not equal to (<>), matches single (?), and matches multiple (*). Database functions available in *Excel* are presented in Table 4 (Microsoft Corporation, 1992a).

Most spreadsheets contain graphing capabilities that allow the creation of numerous types of charts and graphs. This allows the presentation of data in a way that may enhance understanding and presentation of results. Comprehensive charting and graphing functions are available in *Excel*, so a separate graphics program is not necessary, although if an individual has a favorite graphing program outside of the spreadsheet, most spreadsheet data can be exported in a format readable by graphics programs. The chart types and number of variations within each type (in parentheses) available in *Excel* are area (5), bar (10), column (10), line (9), pie (7), radar (5), XY (Scatter) (5), combination (6), 3-D area (7), 3-D bar (4), 3-D column (7), 3-D line (4), 3-D pie (7), and 3-D surface (4). Examples of some of the charts are presented in Appendix A. The creation of charts in *Excel* is very simple and can be accomplished in a matter of seconds. *Excel* also provides a tool called the ChartWizard that simplifies the process even more. Charts can be separate files or embedded in the spreadsheet that contains the data. When the chart is embedded, graphics such as arrows, lines, circles, squares, and etc. can be drawn in the chart. Several graphs or charts can be placed on a single page; size and location are controlled by the user. *Excel* also provides the option of printing graphs and charts in color if a color printer is available.

When a chart is created in *Excel*, the basic default chart is used. If desired, the user may make many types of modifications. They include:

- Rotation of text in four different directions.

- Adding text or arrows that can be moved anywhere on the spreadsheet.
- Ability to change the scaling on the axes by setting the minimum and maximum values and the increments.
- Adding a legend and moving it.
- Modifying the axes tick marks to be inside, outside, or both.
- Changing the width and/or type of line and selecting different line markers.
- Changing the colors or patterns of the chart.
- Adding additional data ranges to the chart after it has been created.
- Adding titles to the chart or the axes.
- Changing type styles and sizes for text items.
- Changing the type of overlay.
- Rotating 3-D graphs.
- Changing the scale to a logarithmic scale.

Other features of *Excel* include spell checking of any text contained in the spreadsheet; sorting of rows, columns, and specific cells; copying within a spreadsheet or from one spreadsheet to another; printing of all or specific parts of the spreadsheet; hiding columns of numbers when printing; and creating macros. Data in *Excel* can be printed as tables with gridlines visible or not visible. Examples of both appear in Appendix A. The spell checker uses a standard dictionary and works in the same way as most word processing spell checkers. If an incorrect spelling of a word is found, several choices are offered from which to choose, or the word can be skipped. *Excel* also offers the option of creating a custom dictionary for individuals who use specialized terms.

Uses in Evaluation

Spreadsheets can be used for many of the types of analyses generally accomplished using statistical or database packages. A spreadsheet can provide both of these types of functions in one package. *Excel* contains many of the statistical functions available in most

statistical packages, and provides a way of maintaining the data as well. There are many situations in which a spreadsheet such as Excel would be advantageous.

- For most evaluators and researchers who use mainframe computers for statistical analysis, disk space is limited and data files must regularly be backed up on tape. If the tape operator is busy, there may be a delay. Each time any information is requested, the tape must be accessed, files written to disk or temporary space, and then any changes written back to tape. When using a microcomputer, the data files can be stored on a hard disk or a floppy diskette that can be located quickly and easily. Several backup copies of the file can be saved and any revisions to the data are easily written back to the hard disk drive or diskette.
- Any data that can be managed in a database can be managed in *Excel* (i.e., test item statistics; management of personnel or records; demographic data on schools, school districts; test data; etc.). with the added advantage of being able to perform calculations and functions, and having graphing capabilities.
- It is much easier to examine the logic used in computations. Each operation is defined and verifiable and it is possible to examine each formula. The disadvantage to this is that in some spreadsheet programs logical errors can sometimes be difficult to locate. If an error is made while typing a formula in *Excel*, the program will inform the user there is an error and then highlight it, making it easy for the user to locate the formula error. "It's [*Excel*'s] the only program [spreadsheet] that can automatically outline your models, present diagnostic error messages when formulas go awry, automatically consolidate worksheets that don't have identical row-and-column setups, and solve optimization problems that require integer programming" (Stinson, 1992, p. 114).
- Evaluation of Programs - *Excel* was recently used to maintain data for and analyze the reliability of writing samples collected for the evaluation of a writing assessment program. The sample consisted of 484 students with identification numbers for schools,

teachers, students, six readers, and writing samples; student names; and six writing sample scores. Analyses conducted included the calculation of descriptive data including means, minimum values, maximum values, standard deviations, frequencies, percentages, and differences between scores. Also calculated were correlation coefficients between readers using the Pearson Product Moment Correlation function. Data were used only for those students who did not receive an off topic score from either of the two readers. The formula used to compute the mean score for each reader was: =AVERAGE(IF($G$3:$G$486=0,"M",IF($I$3:$I$486=0,"M",G3:G486))).

- Enrollment Projections - Many times evaluators and researchers are requested to provide projections, such as enrollments for school districts requiring knowledge of growth in their district in order to plan for future needs. Data are typed in the spreadsheet and depending on the enrollment projection technique used, the formulas are created. Tables can easily be created by hiding columns not to be included in the printed table, using formatting commands for underlining, bold, font changes, etc. Graphs also can be created to demonstrate pictorially the enrollment trend. An example of the spreadsheet, a table, and graphs presenting the data are included in Appendix A as Figures 2 , 3, 4, 5, 6, 7, and 8. An adaptation of the Cohort Survival Method of enrollment forecasting was used to produce the enrollment spreadsheet used as an example in this paper. The Cohort Survival Method of forecasting projects kindergarten enrollment based on birth rates of preceding years and the established ratio of births to kindergarten enrollments. Projections for grades 2 through 6 are based on data from the past five years. The graphs were created in several different formats to demonstrate the graphing capabilities of *Excel*.
- Qualitative Data - Qualitative data often include open-ended questions from interviews or questionnaires. A spreadsheet can be used to enter, code, and sort the open-ended responses. Columns in spreadsheets can contain up to 255 characters,

generally a large enough number for most open-ended responses. The responses can be sorted quickly and with a minimum of effort in any order desired by the evaluator (i.e., by respondent, by item number, by actual response). The spell checker included in *Excel* can be used to check for typing errors and searching functions can be used to search for specific data. It is recommended that the data in *Excel* be exported in ASCII and imported into the word processor for the final report. *Excel* is limited in that information in a cell is contained on one line. In order to fit all information on one page very small type would have to be used or the data would have to be printed on an 11" x 8-1/2" sheet of paper. A spreadsheet file consisting of unsorted qualitative data is presented in Appendix A, Figure 9. The sorted file is presented in Appendix A, Figure 10.

- Management and analysis of test data - Test data can be managed and analyzed using any of the numerous mathematical and statistical functions available in *Excel*. The spreadsheet data and a graph for a case study involving baseline and treatment data are presented in Appendix A, Figures 11 and 12.

Conclusions

Much of the management and analysis of data conducted by evaluators and researchers could be completed successfully using microcomputer spreadsheet software. "Excel 4.0's new functions and add-ins provide sophisticated tools for financial professionals, engineers, statisticians, and researchers, but Excel 4.0 has also broken new ground in the quest for easier everyday functionality" (Stinson, 1992, p. 117). There are many advantages when using spreadsheets, including ease of data entry, graphing capabilities, formatting capabilities, sorting, and the wide range of available statistical functions to name a few. Spreadsheets will be especially helpful for those individuals who do not have access to mainframe computers or expensive statistical software.

References

Bakeman, R. (1992). Understanding social science statistics: A spreadsheet approach. Hillsdale, NJ: Lawrence Erlbaum Associates.

Microsoft Corporation. (1992a). Microsoft Excel Function Reference. Author.

Microsoft Corporation. (1992b). Microsoft Excel User's Guide 1. Author.

Miller, M. J. (1992). New spreadsheet thinking. PC Magazine, 11(19) 81-82.

Stinson, C. (1992). The new spreadsheets: Diversity blossoms amid the rows and columns. PC Magazine, 11(19), 110-170.

Appendix A

Table 1. Statistical Functions Available in Excel, Lotus 1-2-3 for Windows, and PlanPerfect 5.1

FUNCTION	DESCRIPTION
AVEDEV	Average of the absolute deviations of data points from their mean
AVERAGE	Average (arithmetic mean) of data
BETADIST	Cumulative beta probability density function
BETAINV	Inverse of the cumulative beta probability density function
BINOMDIST	Individual term binomial distribution probability
CHIDIST	One-tailed probability of the chi-squared (X^2) distribution
CHIINV	Inverse of the chi-squared (X^2) distribution
CHITEST	Test for independence
CONFIDENCE	Confidence interval for a population
CORREL	Correlation coefficient between two data sets
COUNT	Counts how many numbers in a range or array of cells
COUNTA	Counts the number of nonblank cells in a range or array of cells
COVAR	Average of the products of paired deviations
CRITBINOM	Smallest value for which the cumulative binomial distribution is less than or equal to a criterion value
DEVSQ	Sum of squares of deviations
EXPONDIST	Exponential distribution
FDIST	*F* probability distribution
FINV	Inverse of the *F* probability distribution
FISHER	Fisher transformation
FISHERINV	Inverse of the Fisher transformation
FORECAST	Value along a linear trend
FREQUENCY	Vertically arrayed frequency distribution
FTEST	*F*-test result
GAMMADIST	Gamma distribution
GAMMAINV	Inverse of the gamma cumulative distribution
GAMMALN	Natural logarithm of gamma function
GEOMEAN	Geometric mean
GROWTH	Values along an exponential trend
HARMEAN	Harmonic mean

Table 1 continued.

FUNCTION	DESCRIPTION
HYPGEOMDIST	Hypergeometric distribution
INTERCEPT	Intercept of the linear regression line
KURT	Kurtosis of a data set
LARGE	*k*-th largest value in a data set
LINEST	Parameters of a linear trend
LOGEST	Parameters of an exponential trend
LOGINV	Inverse of the lognormal distribution
LOGNORMDIST	Lognormal distribution
MAX	Maximum value of a data set
MEDIAN	Median of a data set
MIN	Minimum value of a data set
MODE	Most common value in a data set
NEGBINOMDIST	Negative binomial distribution
NORMDIST	Normal cumulative distribution
NORMINV	Inverse of the normal cumulative distribution
NORMSDIST	Standard normal cumulative distribution
NORMSINV	Inverse of the standard normal cumulative distribution
PEARSON	Pearson product moment correlation
PERCENTILE	*k*-th percentile of values in a range
PERCENTRANK	Percentage rank of a value in a data set
PERMUT	Number of permutations for a given number of objects
POISSON	Poisson probability distribution
PROB	Probability that values in a range are between two limits
QUARTILE	Quartile of a data set
RANK	Rank of a number in a list of numbers
RSQ	r^2 value of the linear regression line
SKEW	Skewness of a distribution
SLOPE	Slope of the linear regression line
SMALL	*k*-th smallest value in a data set

Table 1 continued.

FUNCTION	DESCRIPTION
STANDARDIZE	Normalized value
STDEV	Standard deviation based on a sample
STDEVP	Standard deviation based on a population
STEYX	Standard error of predicted regression value
TDIST	Student's t-distribution
TINV	Inverse of the Student's *t*-distribution
TREND	Values along a linear trend
TRIMMEAN	Mean of the interior of a data set
TTEST	Probability associated with Student's *t*-test
VAR	Variance based on a sample
VARP	Variance based on a population
WEIBULL	Weibull distribution
ZTEST	Two-tailed *P*-value of a z-test

Table 2. Additional Statistical Functions Available with Macro Add-In Files

FUNCTION	DESCRIPTION
ANOVA1	Single-factor analysis of variance
ANOVA2	Two-factor analysis of variance with replication
ANOVA3	Two-factor analysis of variance without replication
DESCR	Descriptive statistics
EXPON	Predicts value based on forecast for prior period
FTESTV	Two-sample *F*-test
HISTOGRAM	Calculates individual and cumulative percentages
MCORREL	Produces a correlation matrix
MCOVAR	Produces a covariance matrix
MOVEAVG	Projects values in a forecast period
PTTESTM	Paired two-sample Student's *t*-Test for means
PTTESTV	Two-sample Student's *t*-Test; unequal variances
RANDOM	Random numbers
RANKPERC	Produces table containing ordinal and percent rank
REGRESS	Multiple linear regression
TTESTM	Two-sample Student's *t*-Test for means; equal variances
ZTESTM	Two-sample z-test for means; known variances

Table 3. Logical Functions Available in Excel

FUNCTION	DESCRIPTION
AND	If all arguments are TRUE, returns the value TRUE
FALSE	Logical value FALSE is returned
IF	Specifies a logical test to be performed
NOT	Logic of the argument is reversed
OR	If any argument is TRUE, returns the value TRUE
TRUE	Logical value TRUE is returned

Table 4. Database Functions Available in Excel

FUNCTION	DESCRIPTION
CROSSTAB	Used to define the structure and content of a cross-tabulation table
DAVERAGE	Produces the average of values in a field that match specified criteria
DCOUNT	Counts cells containing numbers that match a specified criteria
DCOUNTA	Counts cells that are not blank and that satisfy a specified criteria
DGET	Used to extract single values from a database
DMAX	Produces the largest number in a field matching specified criteria
DMIN	Produces the smallest number in a field matching specified criteria
DPRODUCT	Used to multiply values in a field that match specified criteria
DSTDEV	Used to estimate the standard deviation of a population based on a sample
DSTDEVP	Used to calculate the standard deviation of a population based on the entire population
DSUM	Used to add numbers in a field that match specified criteria
DVAR	Used to estimate the variance of a population based on a sample
DVARP	Used to calculate the variance of a population based on the entire population

Projected Enrollment for 92/93 to 94/95														
	GRADE		GRADE		GRADE		GRADE		GRADE		GRADE		GRADE	
YEAR	K		1		2		3		4		5		6	
86/87	20		55		38		56		41		46		37	
		2.5000		0.7091		1.0263		0.8571		1.0244		1.2234		
87/88	20		50		39		39		48		42		49	
		2.7000		1.0800		0.9487		0.8718		1.0625		1.3326		
88/89	27		54		54		37		34		51		48	
		1.5556		0.9259		0.9074		0.8649		1.0588		1.0625		
89/90	43		42		50		49		32		36		55	
		1.2791		1.0000		1.3000		0.6939		1.1875		1.0921		
90/91	48		55		42		65		34		38		38	
		1.1875		0.8364		0.9524		0.8000		1.0882		0.9729		
91/92	44		57		46		40		52		37		34	
		1.2273		0.9103		1.0270		0.8175		1.0843		1.1367		
Projected Enrollment														
92/93	46		54		52		47		33		56		42	
		1.1739		0.9103		1.0270		0.8175		1.0843		1.1367		
93/94	47		54		49		53		39		35		64	
		1.1702		0.9103		1.0270		0.8175		1.0843		1.1367		
94/95	47		55		49		50		44		42		40	

Figure 2. Spreadsheet for projected enrollment with gridlines visible.

Projected Enrollment for 1992/1993 to 1994/1995

Actual Enrollment

Year	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
86/87	20	55	38	56	41	46	37
87/88	20	50	39	39	48	42	49
88/89	27	54	54	37	34	51	48
89/90	43	42	50	49	32	36	55
90/91	48	55	42	65	34	38	38
91/92	44	57	46	40	52	37	34
Projected Enrollment							
92/93	46	54	52	47	33	56	42
93/94	47	54	49	53	39	35	64
94/95	47	55	49	50	44	42	40

Figure 3. Table for enrollment projections created with Excel.

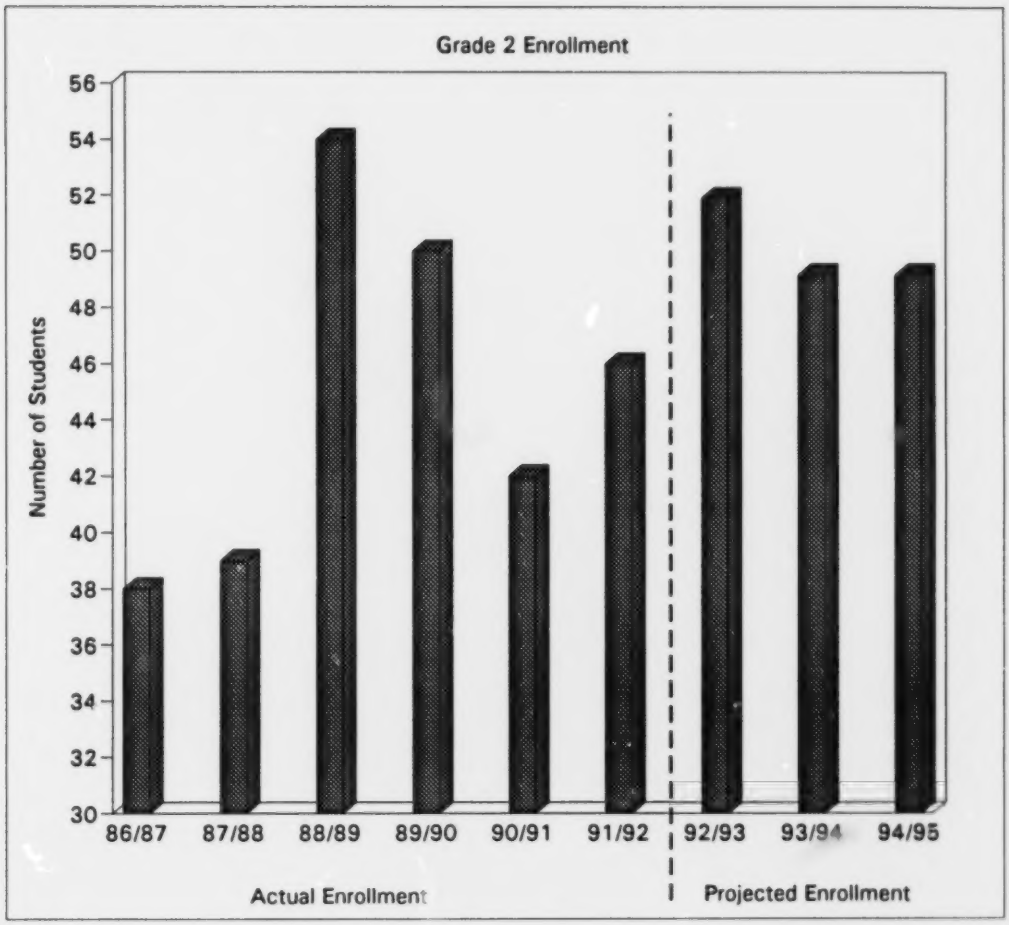

Figure 4. 3-D column graph for grade 2 enrollment with a graphic line dividing actual and projected enrollments.

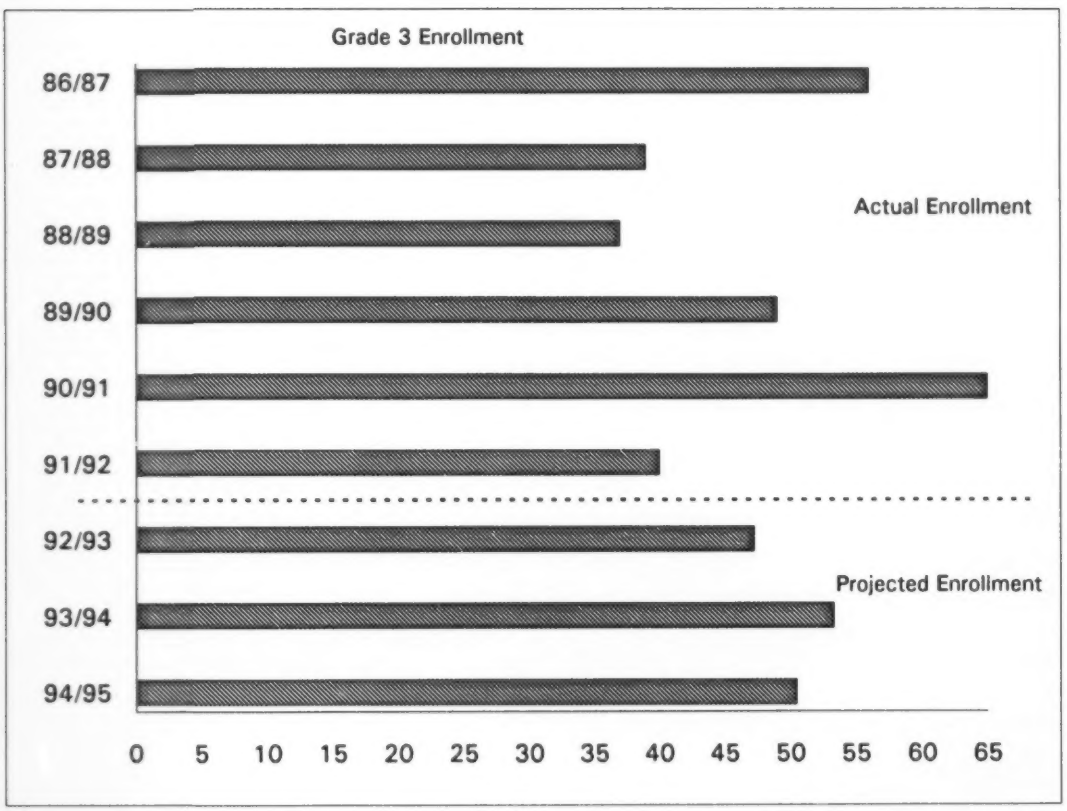

Figure 5. Bar graph for grade 3 enrollment with a graphic line dividing actual and projected enrollments.

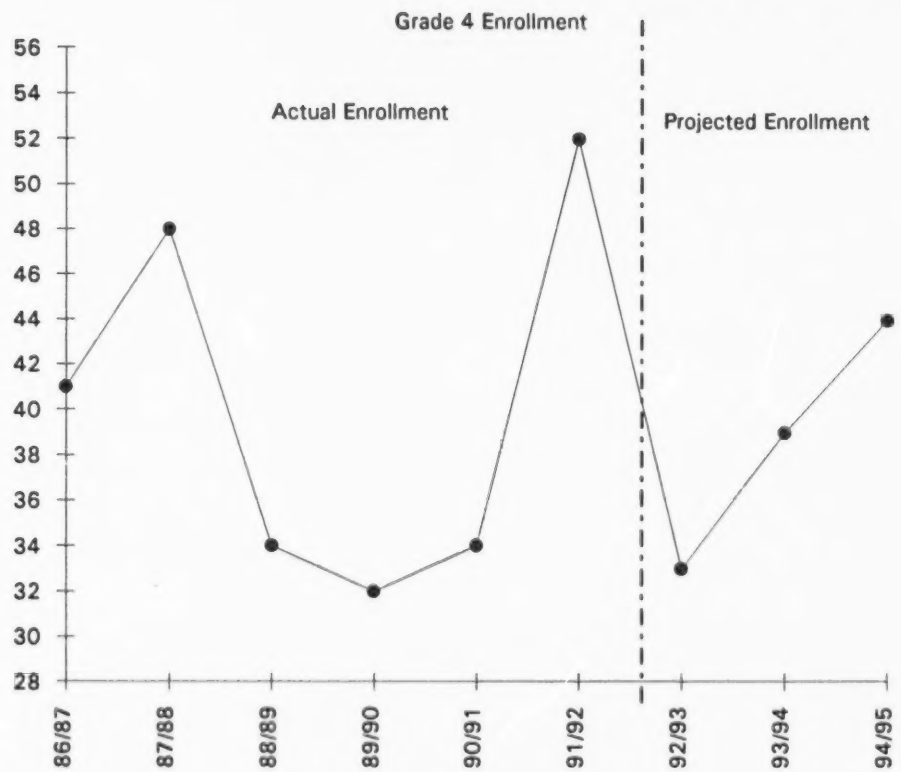

Figure 6. Line graph with markers, a graphic line separating actual and projected enrollments, and no border.

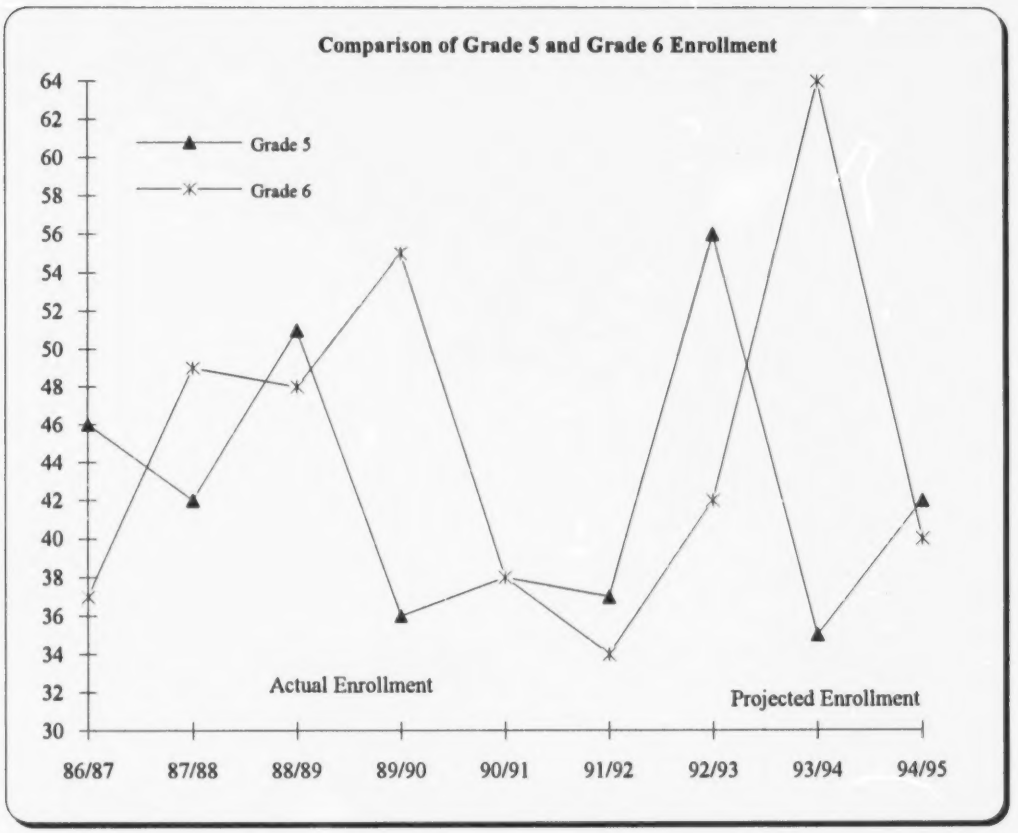

Figure 7. Line graph with markers and a shadowed and rounded border.

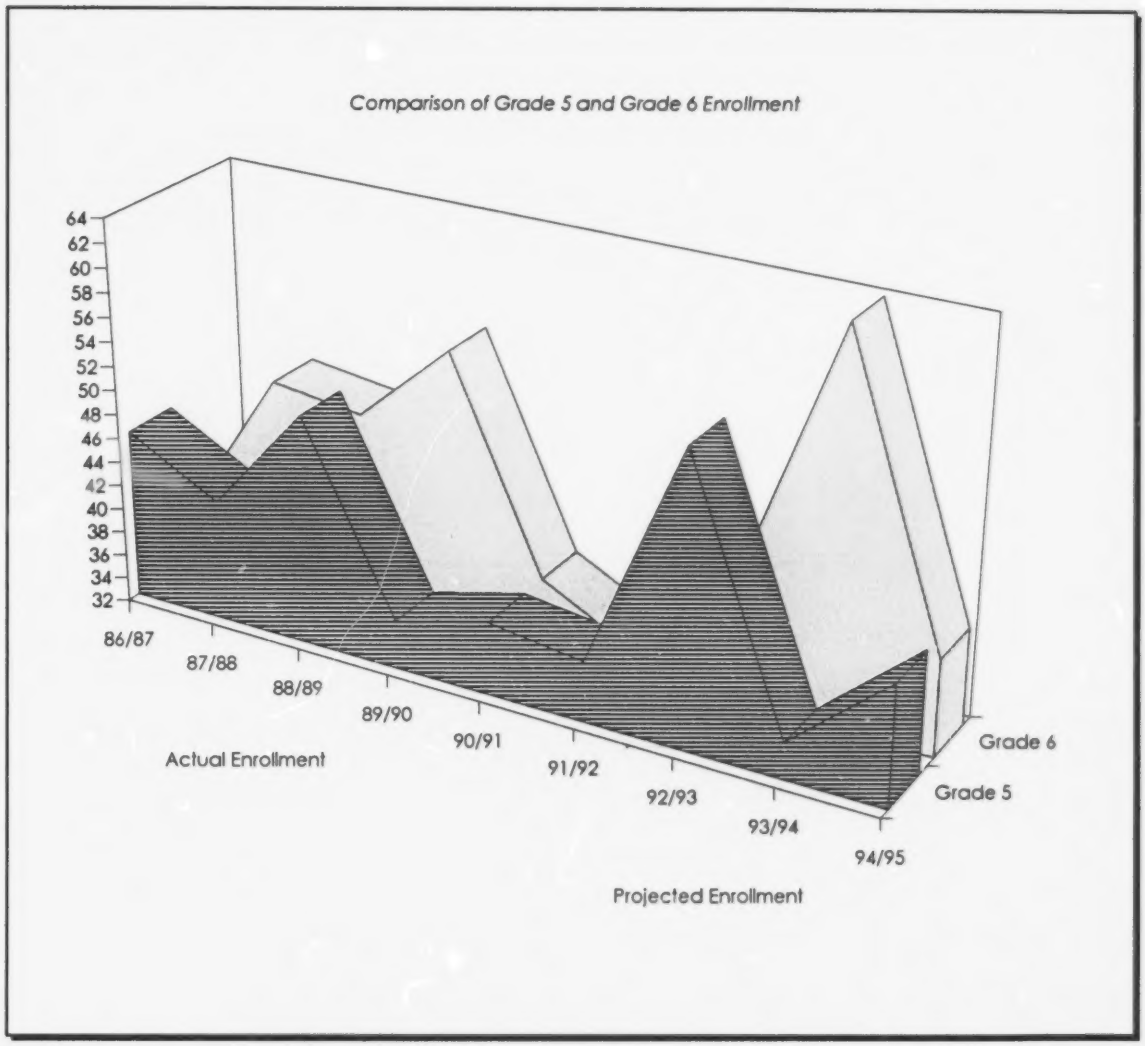

Figure 8. 3-D surface area graph with a shadowed border.

ID	Item #1	Item #2	
101	6	a	Felt the instruction offered was comprehensive.
101		b	Use more visual aids.
102	8	a	Would attend the seminar again. Felt I received a lot of useful information.
102		b	Wouldn't change anything. Really enjoyed it the way it was.
103	15	a	I found the information to be offered very helpful in my area of teaching.
103		b	Consider limiting the number of people allowed to attend so that more individual attention could be given to the participants.
104	10	a	Was not comfortable with all of the information given. Would like to have spent more time on some areas.
104		b	I do not know if I would attend. I'm not sure it was worth the price and travel expenses.
105	7	a	I gathered some very useful information. I enjoyed the humor of the presenters and thought they did an excellent job.
105		b	One or two more breaks; it gets difficult to sit for more than one hour or one and a half hours at a time.

Figure 9. Unsorted responses to questionnaire.

ID	Item #1	Item #2	
101	6	a	Felt the instruction offered was comprehensive.
102	8	a	Would attend the seminar again. Felt I received a lot of useful information.
103	15	a	I found the information to be offered very helpful in my area of teaching.
104	10	a	Was not comfortable with all of the information given. Would like to have spent more time on some areas.
105	7	a	I gathered some very useful information. I enjoyed the humor of the presenters and thought they did an excellent job.
101		b	Use more visual aids.
102		b	Wouldn't change anything. Really enjoyed it the way it was.
103		b	Consider limiting the number of people allowed to attend so that more individual attention could be given to the participants.
104		b	I do not know if I would attend. I'm not sure it was worth the price and travel expenses.
105		b	One or two more breaks; it gets difficult to sit for more than one hour or one and a half hours at a time.

Figure 10. Responses to questionnaire sorted by Item 2.

CASE STUDY - SIGHT WORDS MASTERED

SESSION	WORDS MASTERED
0	
1	6
2	5
3	7
4	8
5	9
6	8
7	10
8	9
9	10
10	8
11	9
12	8
13	7
14	8
15	10
16	9
17	10

Figure 11. Case study spreadsheet without gridlines.

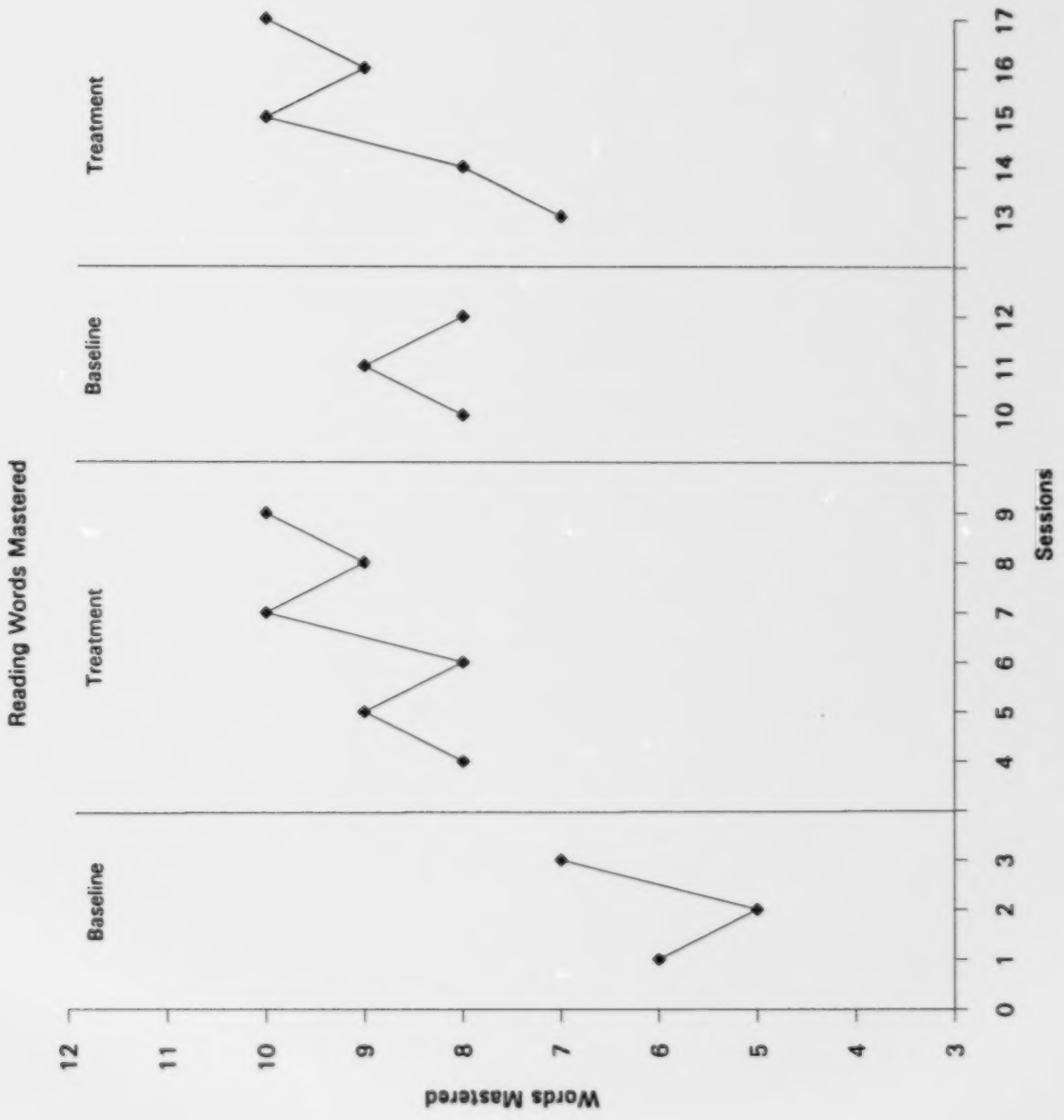

Figure 12. Graph for case study with graphic lines.